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Growth of diamond by rf plasma-assisted chemical vapor deposition

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Growth of diamond by rf plasma-assisted chemical vapor deposition

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A system has been designed and constructed to produce diamond particles by inductively coupled radio-frequency, plasma-assisted chemical vapor deposition. This is a low-pressure, low-temperature process used in an attempt to deposit diamond on substrates of glass, quartz, silicon, nickel, and boron nitride. Several deposition parameters have been varied including substrate temperature, gas concentration, gas pressure, total gas flow rate, rf input power, and deposition time. Analytical methods employed to determine composition and structure of the deposits include scanning electron microscopy, absorption spectroscopy, scanning Auger microprobe spectroscopy, and Raman spectroscopy. Analysis indicates that particles having a thin graphite surface, as well as diamond particles with no surface coatings, have been deposited. Deposits on quartz have exhibited optical bandgaps as high as 4.5 eV. Scanning electron microscopy analysis shows that particles are deposited on a pedestal which Auger spectroscopy indicates to be graphite. This is a phenomenon that has not been previously reported in the literature.

Keywords: Plasma deposition; Thin film; Optical materials
Materials: C(diamond)

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